

Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 20

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1 Work performed this reporting period

1.1 Technical work performed in this reporting period

During this period of performance, we concentrated our efforts in the following technical tasks:

- Integrated I.P. radios to our hardware which enables the master and the slave units to communicate with each other wirelessly for data collection
- Collected coherent data in different node location configurations (indoor, outdoor) for offline processing.

1.1.1 I.P. Radio Integration

We have integrated IP radios into both our master and the slave hardware units. These radios enable the master and the slave to communicate with each other wirelessly for data collection. Figure 1 shows an image of a hardware set with integrated radios.

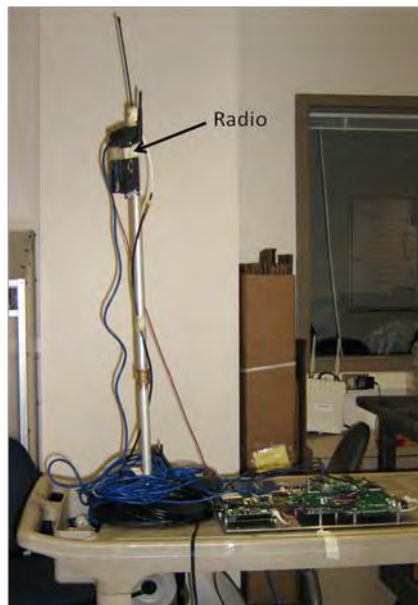


Figure 1. IAI system with integrated radio

1.1.2 Collection of Data

We have collected extensive data for offline processing. The data is collected for two purposes: 1) Bistatic radar imaging, and 2) Improved ranging accuracy.

For all data sets, the I.P. communication radio antennas on both the master and the slave units were situated at about 78" from the ground. The first data set was collected outdoor, in the parking lot of Intelligent Automation. The master unit was stationary while the slave unit was

moved away from the mater incrementally. At each measured distance, the reported range from the system was recorded. During the whole experiment, the master and the slave units retained a line of sight (LOS). Figure 2 shows a map of the experimental site with master and slave locations marked.

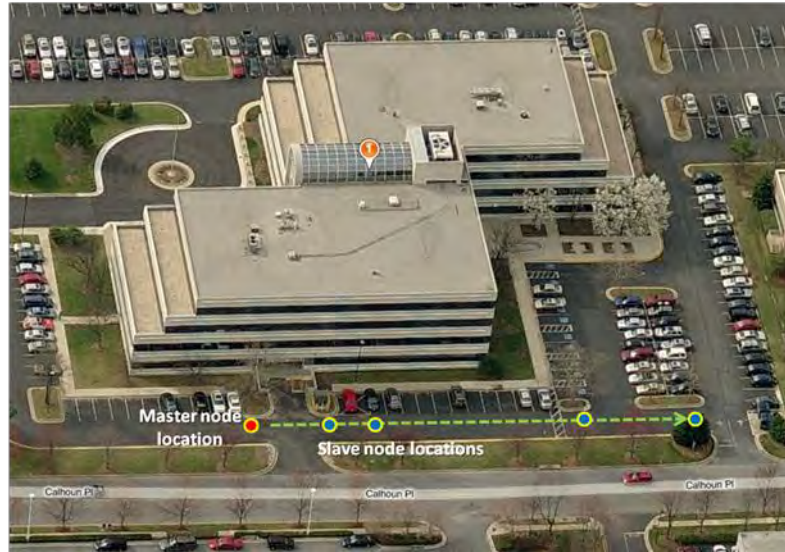


Figure 2. Experiment configuration for the outdoor case

Another set of data was collected inside Intelligent Automation's building. In this experiment, the slave node was kept stationary while the master node was moved at particular locations within the floor. This is shown in Figure 3. For each mater node location, the actual range from slave to master was determined from a calibrated floor plan. For each mater node location, the reported OTOF was also recorded.

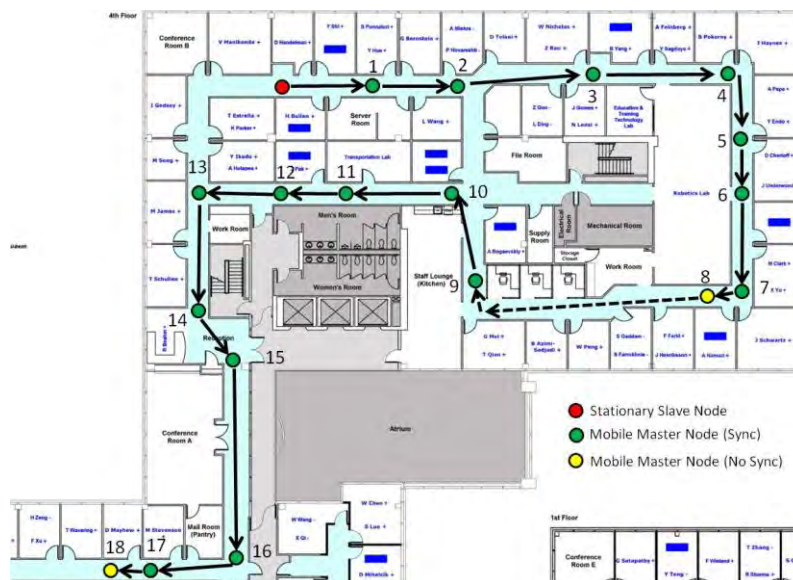


Figure 3. Experiment configuration for the indoor case

For this data set, two subsets were analyzed: (a) master node locations that had LOS (composed of waypoints 1, 2, 3 and 4), and (b) master node locations that did not have LOS (composed of waypoints 5 through 7 and 9 through 17).

In the next reporting period we will process the data and report on the accuracy of the currently-implemented base line algorithm.